

# A Machine Learning Approach to Pricing Corporate Bonds

November 12, 2013



# Overview

- Bonds/Fixed Income are the most important asset class for retiree investment portfolios
- With a rapidly aging baby boomer population, making sure fixed income returns is more important than ever
- Against the backdrop of rising interest rates, the winding down of accommodative fiscal policy and negative year to date returns many bond managers are struggling
- As a result many are turning to scrutinizing their trading costs
- Bonds rarely trade – so what do you use as your benchmark?
- Several companies provide “evaluated pricing” however it tends to be poor quality



# Fraud!

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## Citigroup, JPMorgan Said to Put Currency Dealers on Leave

By Gavin Finch, Liam Vaughan and Ambereen Chaudhury | October 30, 2013






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### Barclays confirms foreign exchange probe

Kevin McCoy, USA TODAY 7:07 p.m. EDT October 30, 2013

Foreign exchange investigations are the latest multi-national examination into how banks set financial benchmarks that affect trillions of dollars in transactions.



(Photo: Carl Court - AFP)

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London-based banking giant Barclays has joined other global banks confirming that regulators have asked them for information in an investigation of possible manipulation of foreign exchange rates used to set trillions of dollars of investments.

While [announcing third-quarter earnings](#) Wednesday, Barclays said it was cooperating with the multi-national investigations, which "appear to involve multiple market participants in various countries."

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## HSBC Says It's Being Investigated in Foreign-Exchange Rate Probe

By Gavin Finch - Nov 4, 2013 5:57 AM ET



**HSBC Holdings Plc (HSBA)**, Europe's largest bank by market value, is under investigation by regulators probing the potential manipulation of foreign-exchange rates.

The lender is among firms from which the U.K.'s Financial Conduct Authority and regulators around world have requested information, London-based HSBC said in a statement today. The bank, which posted a 30 percent jump in third-quarter pretax profit, is cooperating with the inquiries.

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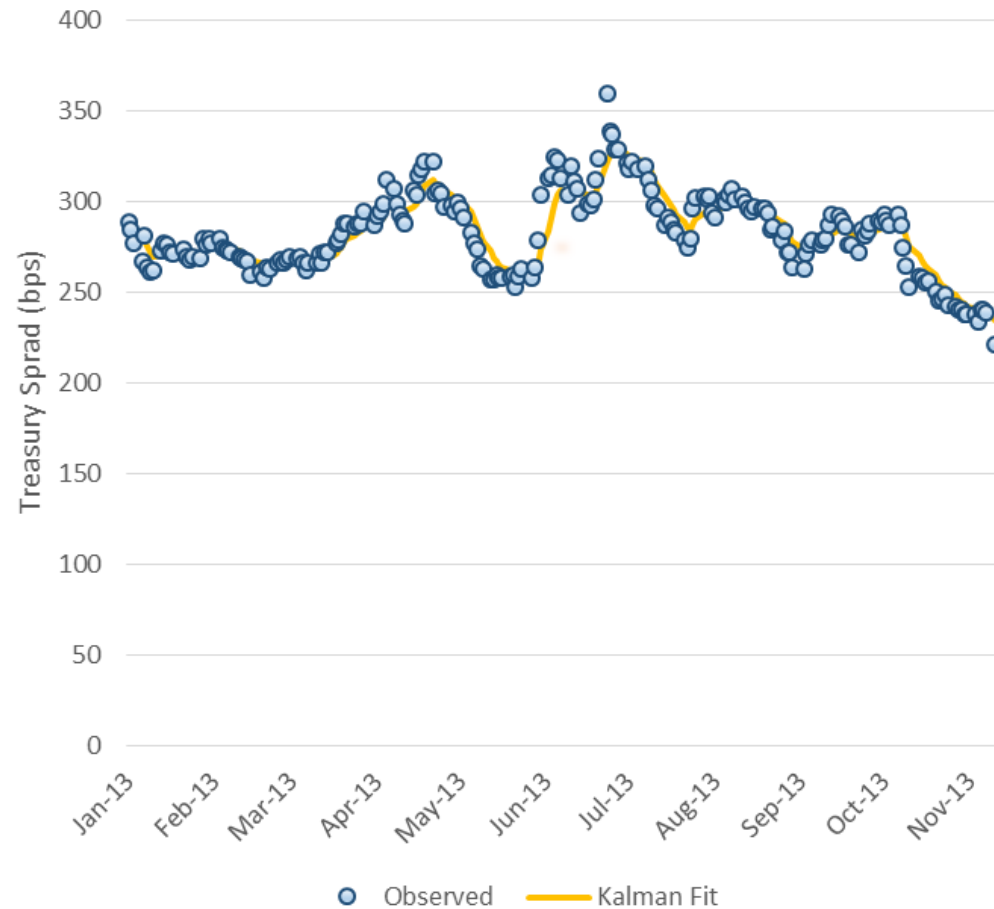
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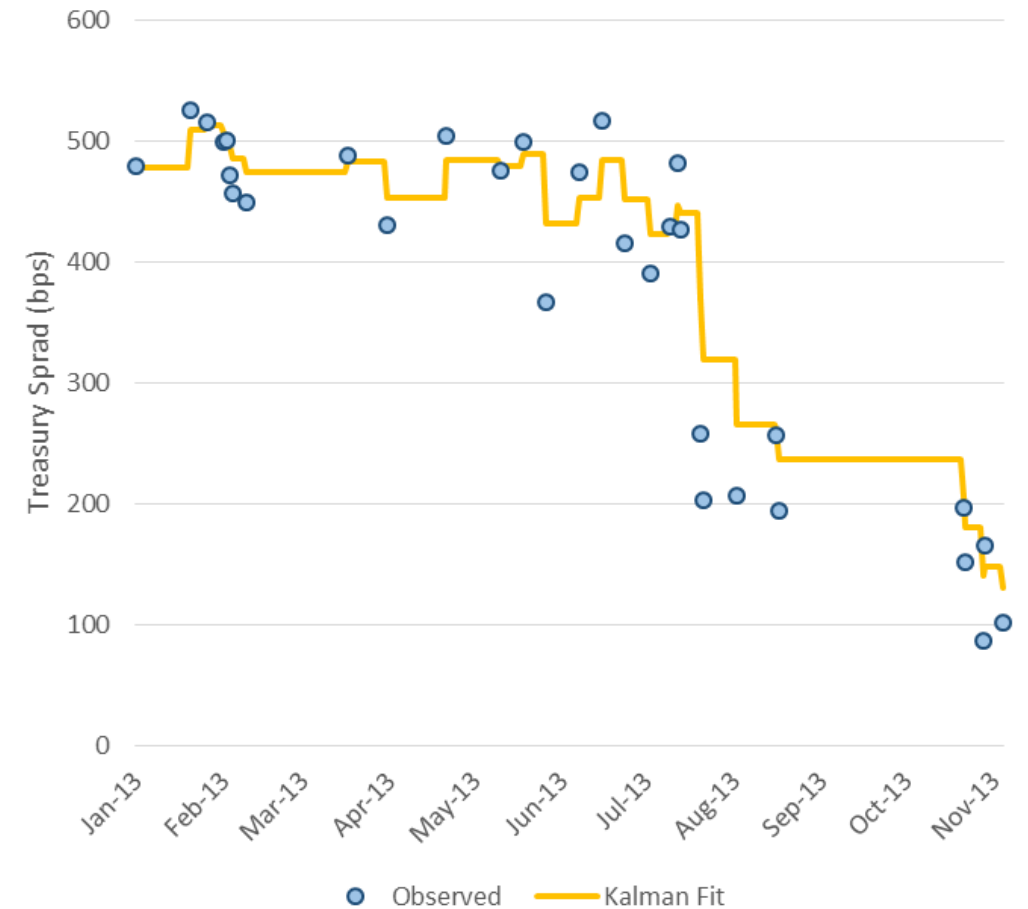
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# Bond Trading Frequency

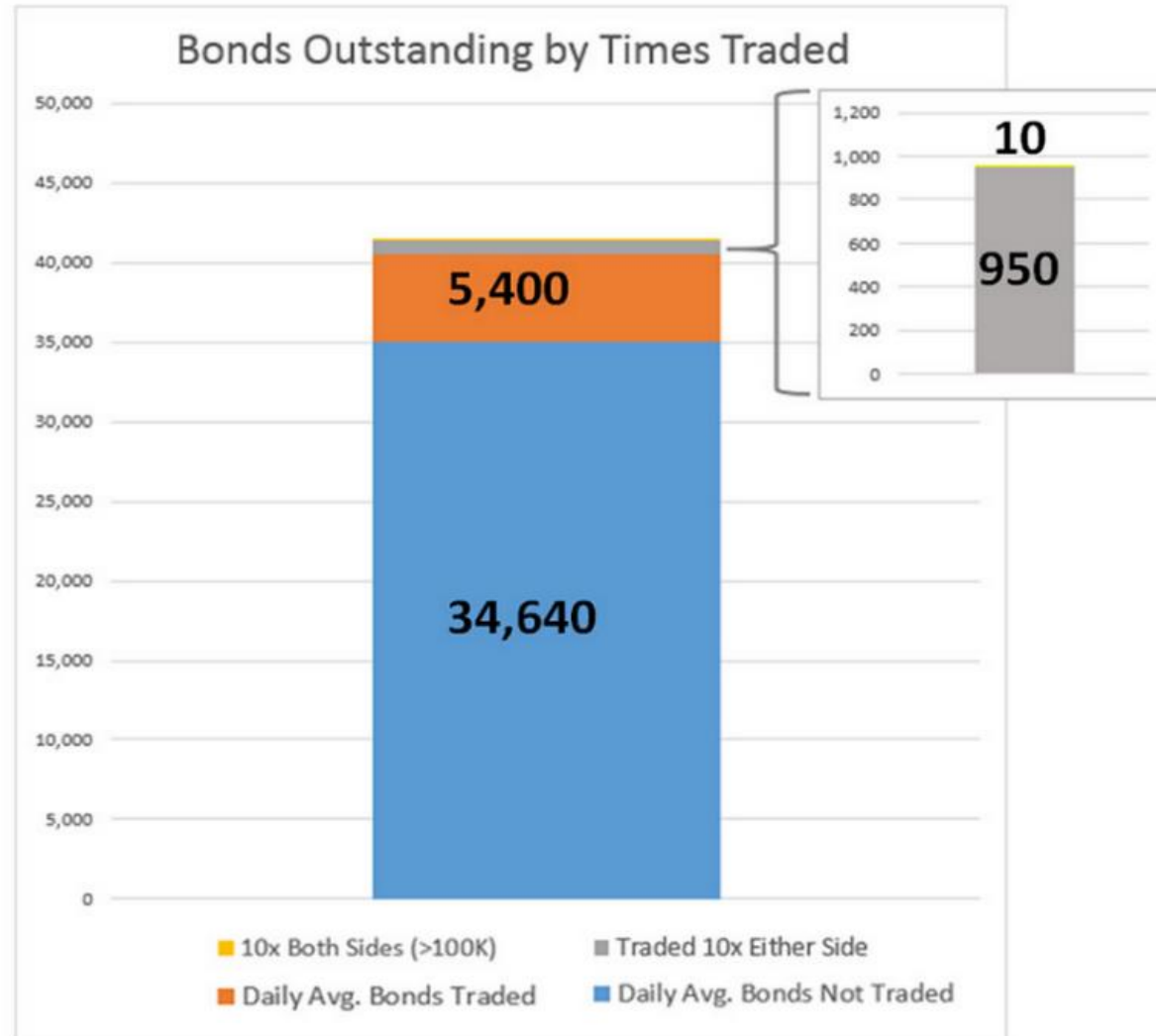
## Liquid Bond Prices Over Time



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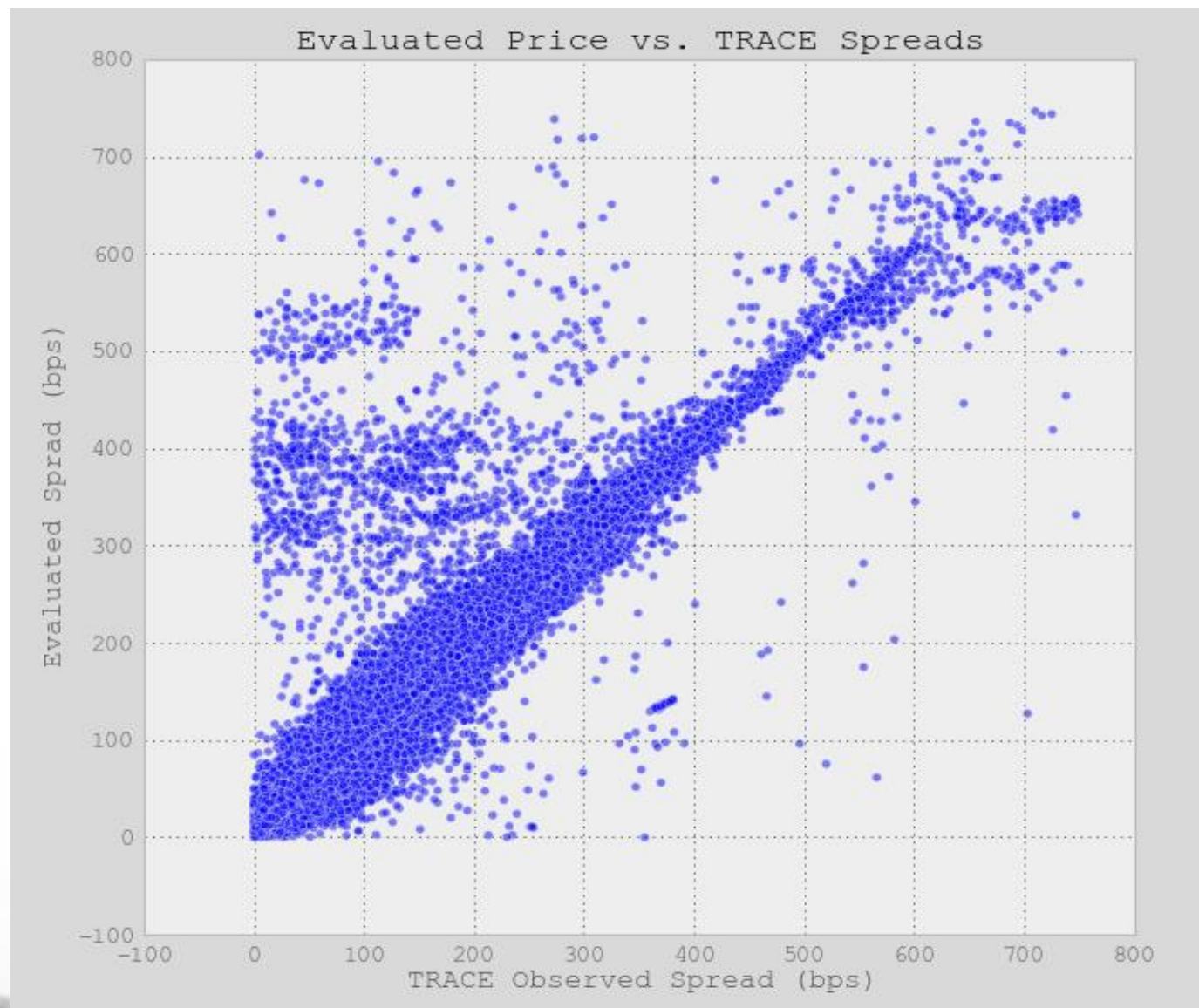


# Bond Trading Frequency

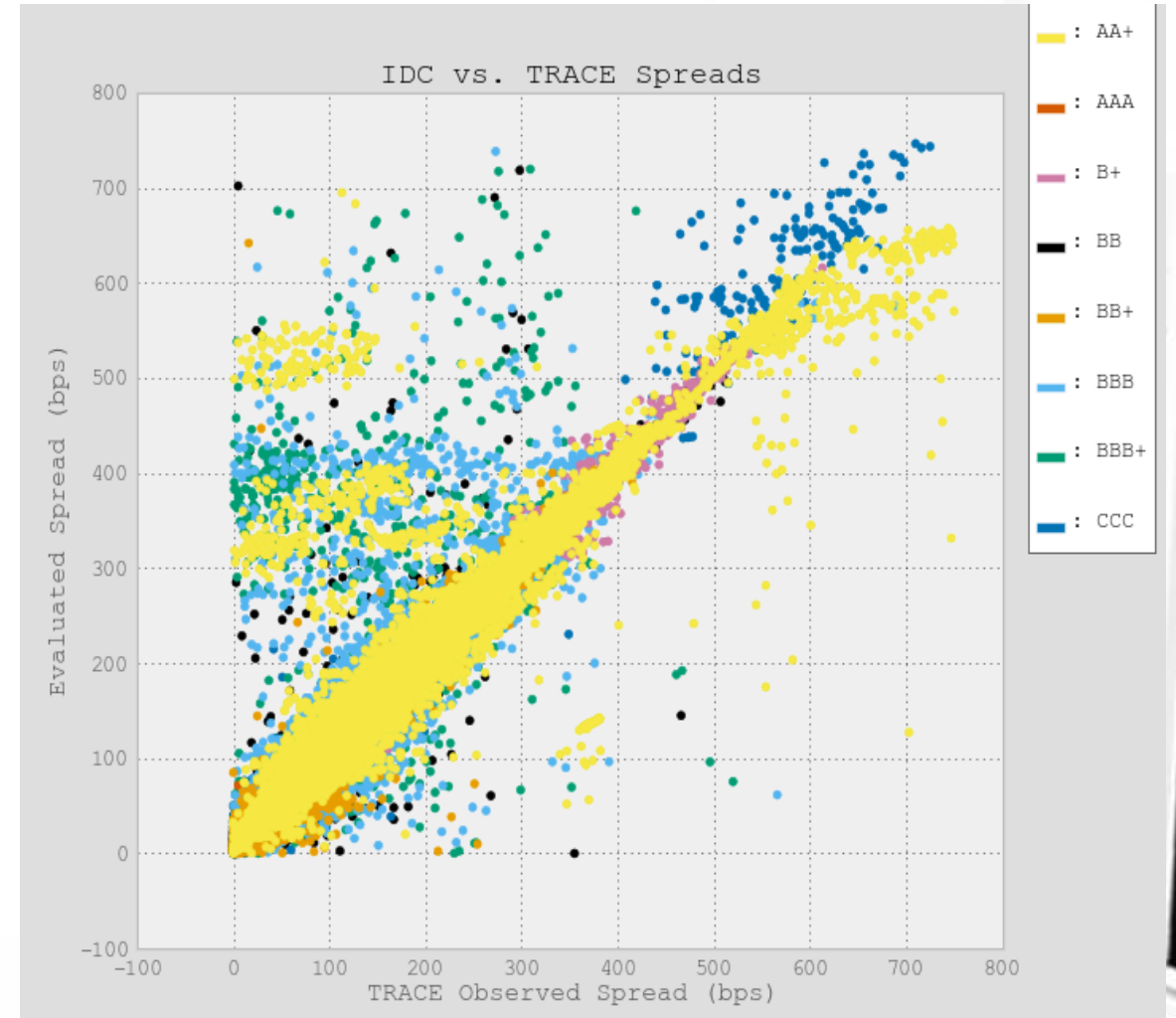
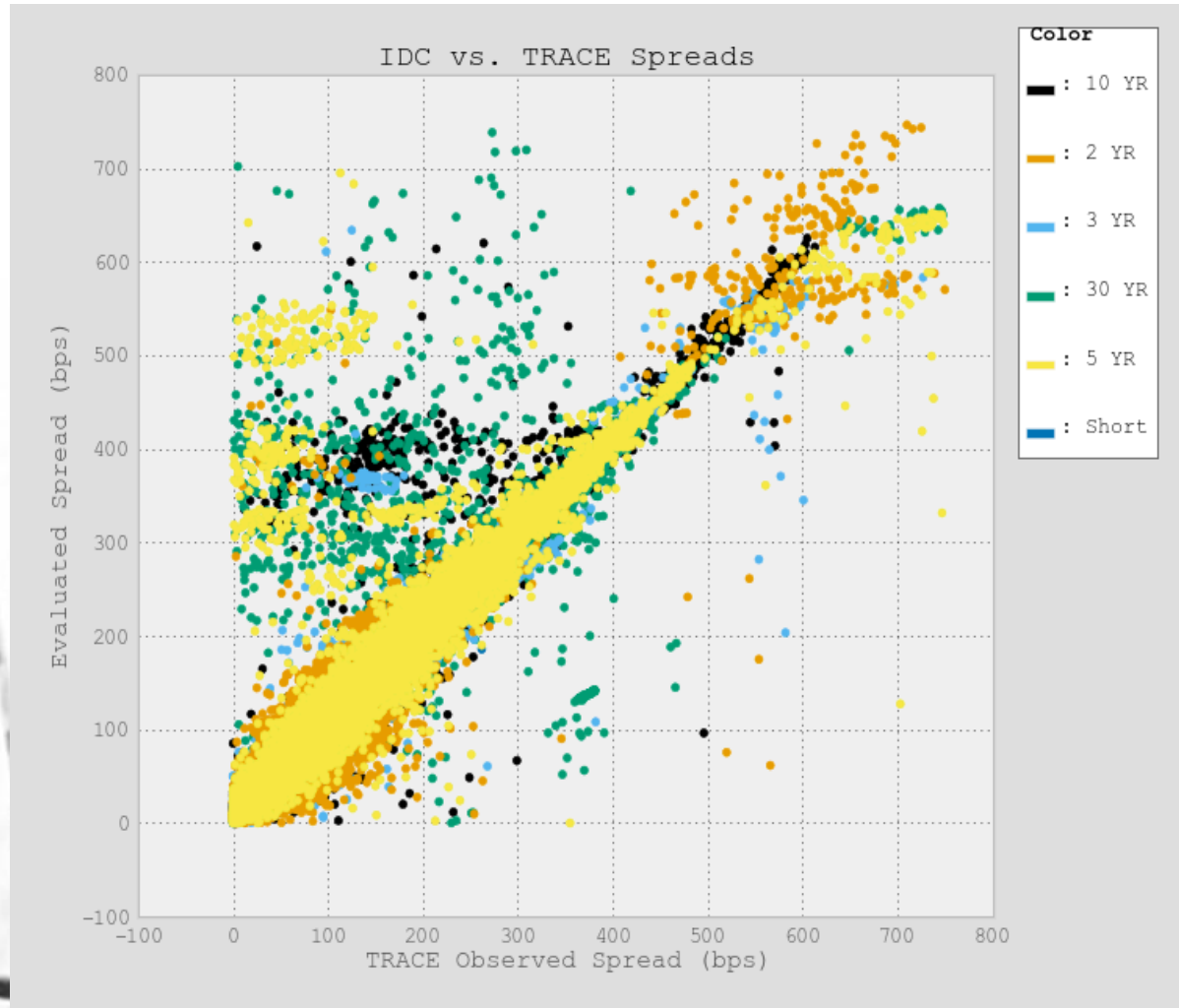




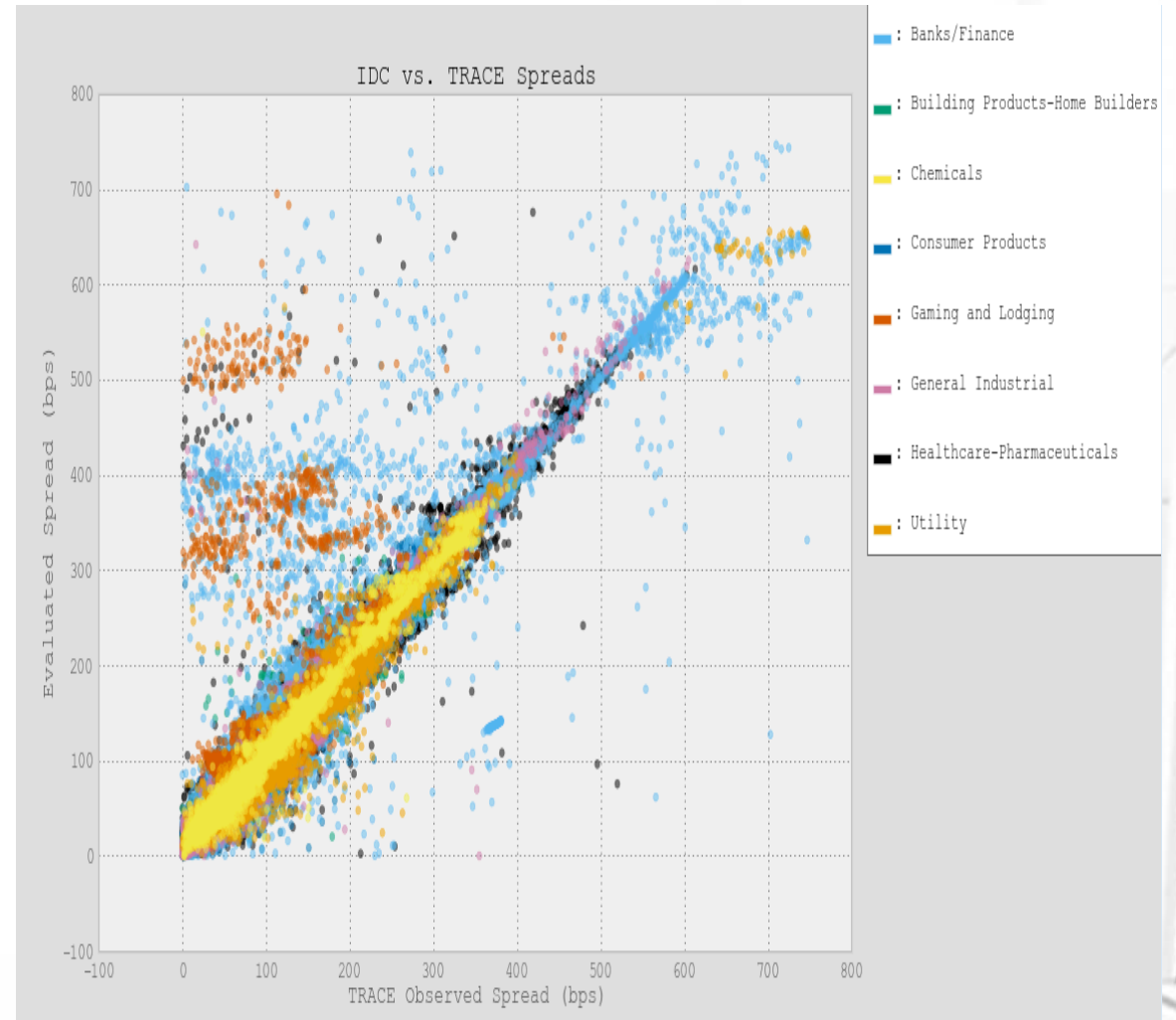
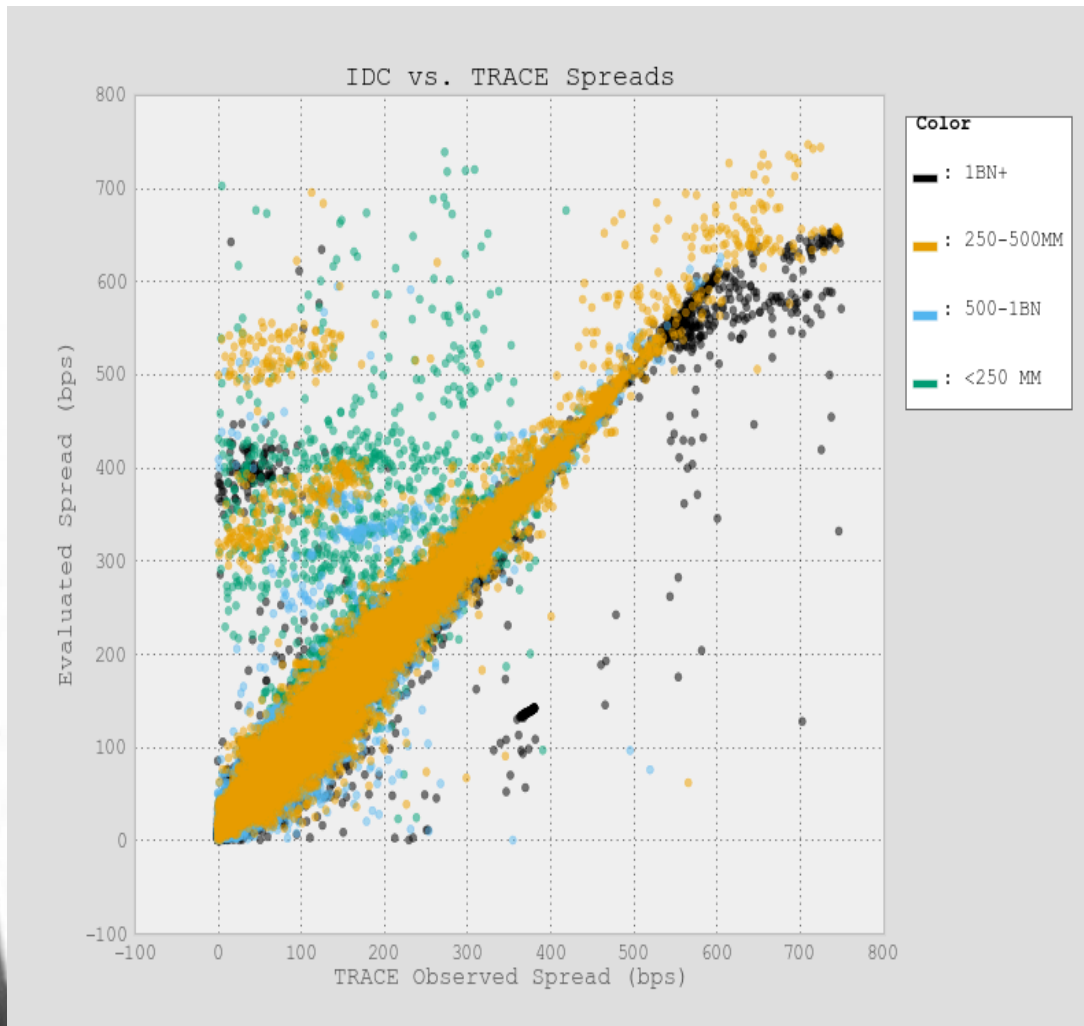
# Evaluated Pricing Accuracy



# Bond Characteristics



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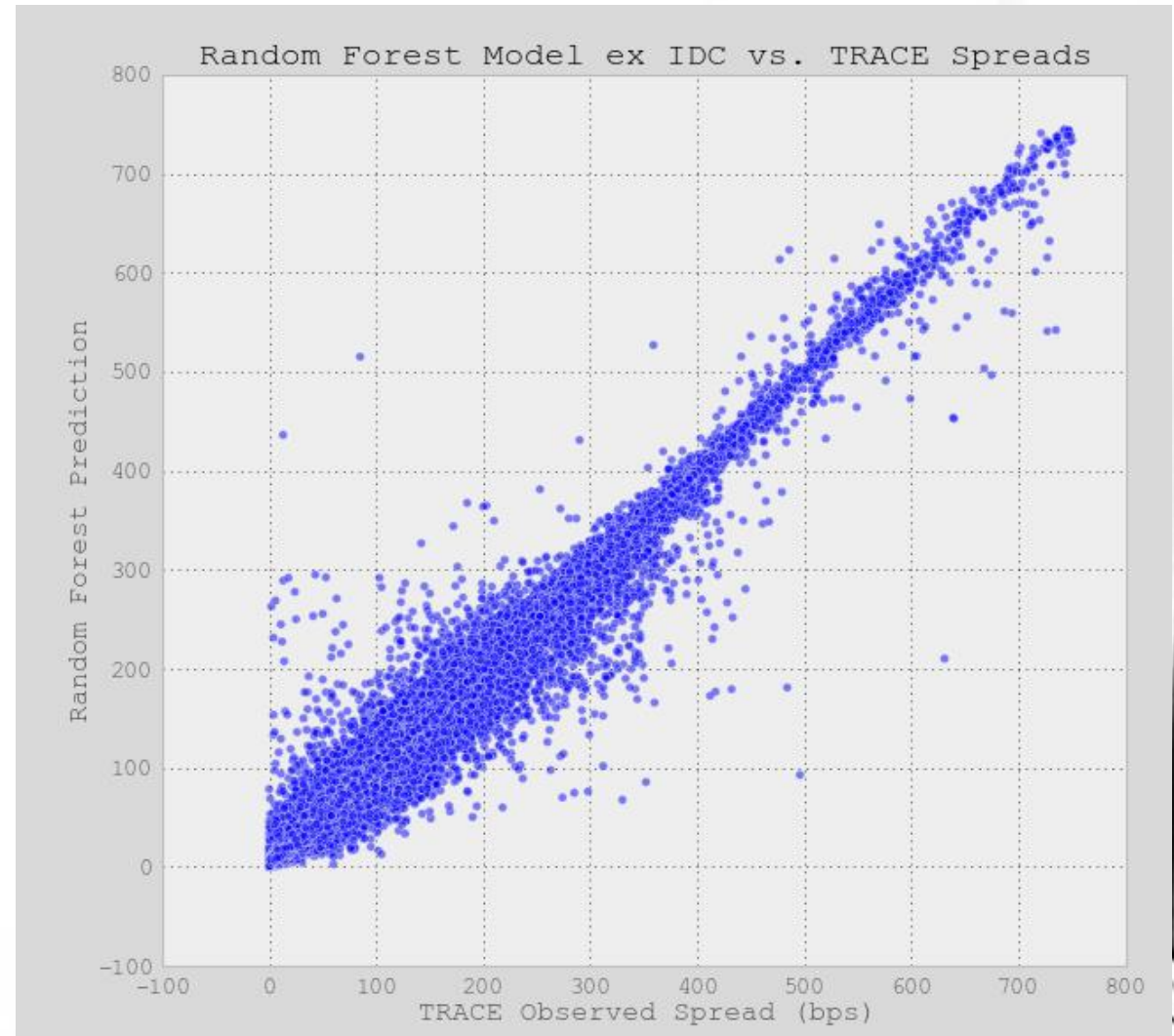
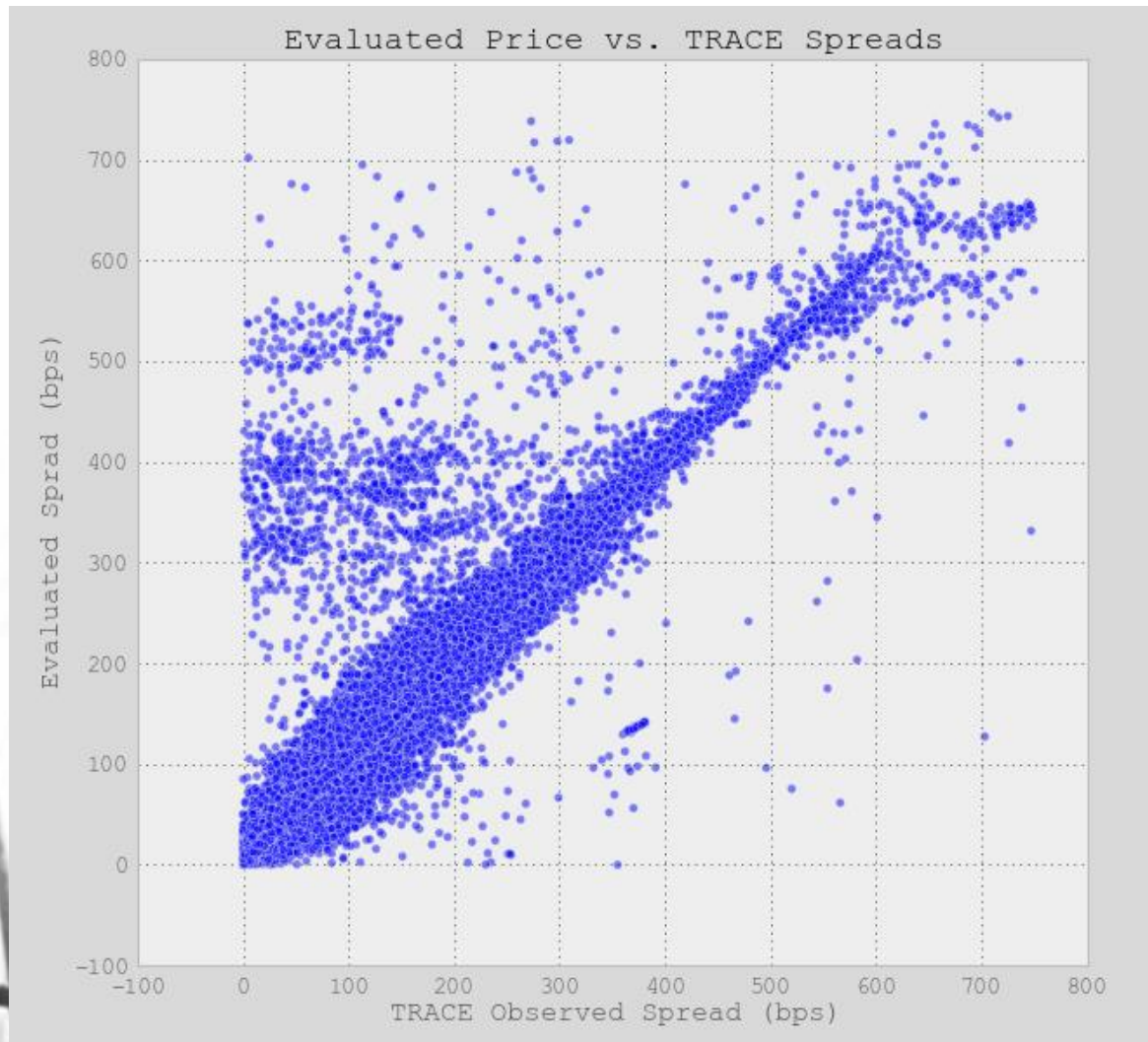




# Model Results

Model	Mean Squared Error	Basis Points Error
Benchmark (Eval)	466.4	21.6 bps
Ridge Regression	685.3	26.2 bps
Basic Decision Tree	244.0	15.6 bps
Extra Tree Regressor	232.6	15.3 bps
Random Forest Regressor	160.0	12.6 bps

# Random Forest Model Results



# Error Frequency Analysis

